REMARKS

In the Action, claims 1-4 are rejected, and claim 5 is withdrawn from consideration as being directed to the non-elected invention.

In response, claim 1 is amended to recite the stirring apparatus being a static mixer in the flow path of the supply pipe line so that the flow of the monomer liquid is in a stirred state downstream of the static mixer while continuously passing through the supply pipe line. Support for this feature is found in Figure 1 and page 14, line 8. New claims 6-11 are also added to further define the features of the invention. For example, claim 6 depends from claim 1 and recites the static mixer being positioned between the inlet end and the outlet end of the supply pipe line to produce a vortical flow downstream of the static mixer as disclosed on page 14, lines 18-22. Claim 7 recites the step of continuously supplying the monomer liquid in a vortical flow to the polymerization apparatus as disclosed on page 16, lines 21-25.

Claims 8 and 9 recite the step of introducing the initiator into the center portion of the supply pipe line and to the peripheral portion of the supply pipe line, respectively, as disclosed on page 13, lines 26-28. Claim 10 recites the outlet end of the initiator feed pipe facing an outlet end of the supply pipe line and introducing the initiator into the monomer liquid in the direction of the flow of the monomer liquid as disclosed on page 13, lines 22-26. Claim 11 recites the static mixer having an inline structure with fixed spiral stirring blades and continuously passing the monomer liquid through the static mixer as disclosed on page 14, lines 8-12. Accordingly, the amendments to claim 1 and claims 6-11 are supported by the specification and drawings.

In view of these amendments and the following comments, reconsideration and allowance are requested.

Rejection Under 35 U.S.C. § 103

Claims 1-4 are rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 3,988,509 to Ballard et al. in view of U.S. Patent No. 6,252,016 to Wu et al. In the Action, Ballard et al. is cited for disclosing a process for producing polymers by introducing a free radical initiator into a polymer stream. Wu et al. is cited for disclosing a polymerization process in a non-cylindrical channel where a polymer emulsion is prepared by premixing in a separate mixing apparatus or mixing vessel prior to introducing to the channel.

The combination of Ballard et al. or Wu et al. do not disclose or suggest a process of continuously supplying a monomer liquid into a supply pipe line, passing the monomer liquid through a static mixer in the flow path of the supply pipe line and introducing a polymerization initiator into the flow of the monomer liquid being in a stirred state downstream of the static mixer, and thereafter supplying the resulting mixed liquid to a polymerization apparatus as recited in amended claim 1. More specifically, the combination of Ballard et al. and Wu et al. do not disclose or suggest a static mixer in a supply pipe line, producing a stirred state of the monomer liquid downstream of a static mixer, or introducing an initiator into a stirred state of the monomer liquid in a supply pipe line.

The Action again refers to the vessel of Wu et al. as allegedly being the same as the claimed supply pipe line. The definition applied in the Action is clearly contrary to the vessel referred to or intended by Wu et al. The term "vessel" is used interchangeably with the mixing apparatus and is clearly not a pipe or supply pipe line as suggested in the Action. Thus, regardless of the dictionary definition applied in the Action, Wu et al. clearly does not intend the definition being arbitrarily applied by the Action to include a supply pipe. The vessel of Wu et al. is specifically disclosed as being an emulsion forming tank. Example 1 of Wu et al. also refers to a premixer to form a stable monomer emulsion and a static mixer to

mix the catalyst and the activator solutions with the monomer emulsions. The emulsion tank and reactor of Wu et al. is not a supply pipe line as claimed having a monomer liquid continuously passing therethrough. Thus, the definition of the term vessel applied by the Examiner is contrary to the specific disclosures or intent of Wu et al.

Regardless of the dictionary definition applied by the Action, Wu et al. provides no suggestion of a process of continuously supplying a monomer liquid to a supply pipe line and passing the monomer liquid through a static mixer within the supply pipe line to produce a flow of the monomer liquid in a stirred state downstream of the static mixer while continuously passing the monomer liquid through the supply pipe line as claimed. The emulsifier stirring apparatus of Wu et al. is not a supply pipe line having a flow path, does not have a static mixer within a flow pipe line, and does not produce a stirred monomer liquid flow downstream of a static mixer. Accordingly, Wu et al. provides no motivation or incentive to one of ordinary skill in the art to modify the process of Ballard et al. Furthermore, even if one were to modify the process of Ballard et al. according to Wu et al., the resulting process would still have a mixing tank or emulsifying apparatus prior to feeding the monomer liquid to the polymerization apparatus.

The combination of Ballard et al. and Wu et al. do not suggest an inline static mixer in a supply pipe line for carrying a monomer liquid or the step of introducing the initiator into the monomer liquid in a mixed state downstream of the inline static mixer as in the claimed invention. As discussed above, Ballard et al. refers to a "vessel" which is clearly intended to be a mixing tank or apparatus and not a flow pipe as asserted in the Action. Furthermore, neither Ballard et al. or Wu et al. disclose or suggest an inline static mixer in a supply pipe line for a monomer liquid.

Contrary to the assertion in the Action, the specification supports the unexpected advantages and results of the process according to the claimed invention. Comparative Example 2 on page 22 of the specification discloses combining the monomer liquid and the polymerization initiator in a first step, and thereafter passing the monomer liquid and polymerization initiator through an inline mixer. Thus, Comparative Example 2 combines the monomer liquid and polymerization initiator and then passes the combination through the mixer in the same manner as in Wu et al. and the process according to the proposed combination of Ballard et al. and Wu et al. The process according to Comparative Example 2, which corresponds to Wu et al. and the proposed combination of the cited patents, has the disadvantage of clogging the apparatus and mixer with the resulting polymer formed by the combination of the monomer liquid and polymerization initiator. See, for example, the last paragraph on page 22 of the present specification. In contrast to the process according to Wu et al. or the proposed combination of Ballard et al. and Wu et al., the process according to the claimed invention provides uniform mixing and reduces the occurrence of clogging of the apparatus. The mixing vessel according to Wu et al. is not able to produce the rapid and efficient uniform mixing of the monomer liquid and polymerization initiator as in the process of the claimed invention.

The present invention as recited in claim 1 recites a process of directing a monomer liquid through a flow path of a supply pipe line and directing the monomer liquid through a static mixer in the flow path to produce a stirred state of the monomer liquid, and thereafter introducing the polymerization initiator into the stirred state of the monomer liquid downstream of the static mixer, and thereafter supplying the mixed liquid to a polymerization apparatus. Neither Ballard et al., Wu et al., nor a combination thereof, suggest the claimed process. Ballard et al. is directed to a process for producing reduced melt index and low gel

content ethylene copolymers. Ballard et al. does not suggest producing water-absorbent resins as recited in claim 1. Ballard et al. further fails to disclose a static mixer in the flow path of a supply pipe line to produce a monomer liquid in a stirred state while passing through the supply pipe line. Ballard et al. also fails to disclose introducing a polymerization initiator into a mixed state of the monomer liquid within the supply pipe line as claimed.

As noted in the previous response, Ballard et al. corresponds substantially to Comparative Example 1 in the specification. The process of Ballard et al. passes the monomer liquid through line 3 to the reactor 5. There is no suggestion of a static mixer in the apparatus of Ballard et al. The Action recognizes that a monomer liquid passing through a line where no stirring apparatus is present does not produce a flow in a stirred state. Ballard et al. introduces the initiator through line 4 immediately upstream of the reactor, but does not introduce the initiator into a monomer liquid in a stirred state.

Comparative Example 1 in the specification adds the polymerization initiator to the flow path without the use of a stirring apparatus or static mixer as recited in claim 1. Thus, Comparative Example 1 corresponds substantially to the process of Ballard et al. As shown in the data in Table 1 on page 22 of the specification and as described on page 22, lines 13-28, the claimed invention provides improved results compared to the process of Comparative Example 1 and Ballard et al. Comparative Example 1 produced a polymer having a higher extractable content and a higher amount of residual monomer compared to the claimed process where the monomer liquid is introduced into a stirred state of the monomer liquid downstream of a stirring apparatus such as a static mixer. As noted above, Comparative Example 2 in the specification, which also does not use the claimed stirring apparatus, resulted in clogging which inhibits continuous use of the apparatus.

Example 1 in the specification corresponds to the claimed invention where the initiator is introduced into a stirred state of the monomer liquid which is then introduced into the reactor to carry out the polymerization reaction. The resulting polymer according to the claimed invention had a lower extractable content and lower amount of residual monomer than the polymer produced by the process of Comparative Example 1 as shown in Table 1 on page 22. Thus, the specification demonstrates the differences between the claimed process according to Ballard et al. and Wu et al.

Wu et al. also fails to disclose a static mixer in a supply pipe line, and thus, fails to provide the deficiencies of Ballard et al. such that the resulting combination as suggested in the Action does not lead one of ordinary skill in the art to the claimed invention. Furthermore, Wu et al. provides no motivation or incentive to modify the process of Ballard et al. as suggested. Wu et al. discloses feeding the initiator into a mixing apparatus and forming a stable emulsion. The resulting emulsion is then delivered to the supply pipe line to the reactor. The emulsion is not produced in the supply pipe line and is not produced by introducing an initiator downstream of a static mixer as claimed. The emulsion of Wu et al. is formed before feeding the emulsion to a pipe line which then carries the mixture to the non-cylindrical channel.

Example 1 of Wu et al. refers to a static mixer to stir the catalyst including the initiator, activator solution and monomer emulsion. There is no suggestion of introducing the polymerization initiator downstream of the static mixer into a monomer liquid being in a stirred state. As noted above, this corresponds substantially to Comparative Example 2 of the present specification which does not produce the same results as in the claimed process.

For the reasons discussed above, the combination of Ballard et al. and Wu et al. do not suggest to one of ordinary skill in the art the claimed process of introducing a

polymerization initiator into a monomer liquid being in a stirred state where the monomer liquid passes through a static mixer in a supply pipe line and the initiator is introduced into the monomer liquid downstream of the static mixer as claimed. Accordingly, independent claim 1 is not obvious over the combination of Ballard et al. and Wu et al.

The combination of Ballard et al. and Wu et al. do not suggest a monomer liquid having a concentration of not less than 40 wt% of the monomer liquid as in claim 2 where the monomer liquid is passed through an inline static mixer and the initiator is introduced downstream of the static mixer as in claim 2. Claim 3 depends from claim 1 and recites the monomer liquid having a liquid temperature of not lower than 50°C when the polymerization initiator is introduced into the stirred monomer liquid. Ballard et al. and Wu et al. do not disclose or suggest a continuously stirred monomer liquid in a supply pipe line at a temperature of not lower than 50°C, and thereafter introducing the initiator into the stirred state of the monomer liquid as in claim 3.

Claim 4 depends from claim 1 and recites the monomer liquid having a stirring Reynolds number of not smaller than 50. For the reasons discussed above, Wu et al. and Ballard et al. either alone or in combination provide no suggestion of a stirred monomer liquid in a supply pipe line by passing through an inline static mixer. Thus, Wu et al. and Ballard et al. clearly fail to disclose or suggest a stirred monomer liquid in a supply pipe line having a stirring Reynolds number of not smaller than 50 as in claim 4. Accordingly, claims 2-4 are allowable over the combination of Ballard et al. and Wu et al.

Ballard et al. and Wu et al. further fail to disclose the features of claims 6-11 either alone or in combination with the features of claim 1. For example, Wu et al. and Ballard et al. do not disclose the static mixer between the inlet end and outlet end of the supply pipe line where the static mixer produces a vortical flow downstream of the static mixer as in claim 6,

supplying the monomer liquid in a vortical flow to the polymerization apparatus as in claim 7, introducing the initiator into the center portion of the supply pipe line as in claim 8, introducing the initiator into a peripheral portion of the supply pipe line as in claim 9, positioning an initiator feed pipe within the supply pipe line having an outlet end facing the outlet end of the supply pipe line and introducing the initiator in the direction of the flow of the monomer liquid as in claim 10, or the static mixer being an inline structure with fixed spiral stirring blades as in claim 11. Accordingly, these claims are allowable over the art of record.

In view of these amendments and the above comments, reconsideration and allowance are requested.

Respectfully submitted,

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